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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/387,961	11/22/1999	PAUL A JAKOBSON	JAKOBSON-6	3219

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EXAMINER

CUNNINGHAM, STEPHEN C

ART UNIT	PAPER NUMBER
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3663

DATE MAILED: 11/13/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/387,961

Applicant(s)

JAKOBSON ET AL.

Examiner

Stephen C. Cunningham

Art Unit

3663

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 June 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-37 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 19-30 and 37 is/are allowed.
- 6) ☒ Claim(s) 1-10, 15, 31, 35 and 36 is/are rejected.
- 7) ☒ Claim(s) 11-14, 16-18 and 32-34 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 September 1999 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 15 July 2002 is: a) ☐ approved b) ☒ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 15.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

The indicated allowability of claims 1-10, 15, 31, 35, and 36 is withdrawn in view of the newly discovered reference(s) to Yoon et al. US 6,292,291. Rejections based on the newly cited reference(s) follow.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

1. Claims 1, 2, and 15, are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoon et al. '291 (hereafter "Yoon") in view of Csipkes et al. '132 (hereafter "Csipkes").

With respect to claim 1, Yoon teaches an apparatus comprising:

a first subunit comprising a plurality of amplification components

(220);

a subunit comprising a plurality of input stage components (210);

and

a subunit comprising a plurality of output stage components (230).

See figures 2.

Csipkes teaches a modular amplifier comprising a separate pump module (abstract);

a support board (fig. 3, 118 or fig. 9, 210); and

pluggable connectors (fig. 7c, unlabeled connectors).

It would have been obvious to modify the apparatus of Yoon by mounting each amplifier subunit on a support board, providing a pumping subunit separate from the amplifier unit, and connecting the subunit by pluggable connectors in order to increase modularity and facilitate faulty stage replacement.

With respect to claim 2, Yoon teaches a second amplification module that is optically connected to each of the input/output modules and a pump module.

With respect to claim 15, Yoon and Csipkes teaches providing a signal amplifying units, input subunits, output subunits, and pumping subunits, as described in the rejection of claim 1.

Yoon refers to amplifier components as units.

Csipkes teaches a modular amplifier.

Unit is defined as (a) a mechanical part or module; (b) an entire apparatus or the equipment that performs a specific function.

Modular is defined as –designed with standardized units or dimensions, as for assembly and repair or flexible arrangement and use.

A modular apparatus designed for assembly and repair or flexible arrangement and use require plural units of each unit type to function as replacement units or to modify functional arrangement. It would have been obvious to provide a plurality of units of each component type in order to replace faulty modules or to provide flexible arrangement.

2. Claims 3-5, 10, 31, 35, and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoon in view of Csipkes and in view of Becker et al. "Erbium-Doped Fiber Amplifiers Fundamentals and Technology" (hereafter "Becker")

With respect to claim 3, Becker teaches a second amplification stage comprising a plurality of optical components. It would have been obvious to modify the apparatus by adding a second amplification stage to the single stage of Yoon in order to provide high gain and low noise.

With respect to claim 4, Csipkes teaches a second pump module for pumping a second amplification stage. It would have been obvious to modify the apparatus by providing a second pump module in order to pump the second gain stage thus providing increased gain.

With respect to claim 5, Becker teaches a dual stage amplifier wherein both the first and second stages are pumped with forward propagating pump light. See figure 8.18 and section 8.3.3 Multistage Amplifiers. Becker further teaches a gain flattening filter placed intermediate the first and second gain section in order to balance output power and noise. See, page 291, Spectral flattening – passive element methods.

With respect to claim 10, Yoon teaches an apparatus comprising:

a first subunit comprising a plurality of amplification components (220);

a subunit comprising a plurality of input stage components (210) wherein a photodetector is serially connected to the coupler; and

a subunit comprising a plurality of output stage components (230).

See figures 2.

Csipkes teaches a modular amplifier comprising a separate pump module (abstract);

a support board (fig. 3, 118 or fig. 9, 210);

pluggable connectors (fig. 7c, unlabeled connectors); and

a fifth subunit comprising a second pump source.

Becker teaches a dual stage optical amplifier comprising a plurality of first stage and a plurality of second stage optical components.

It would have been obvious to modify the apparatus of Yoon by mounting each amplifier subunit on a support board, providing a pumping subunit separate from the amplifier unit, and connecting the subunit by pluggable connectors in order to increase modularity and facilitate faulty stage replacement and to further modify the apparatus by providing a second stage amplifier to provide high gain and low noise.

With respect to claim 31, Yoon teaches a method inherent in the apparatus comprising:

arranging on a second subunit a plurality of amplification components;

arranging on a third subunit a plurality of input stage components;

arranging on a fourth subunit a plurality of output stage components.

See figure 2 teaching an apparatus comprising: input (210), output (230), and amplifying (220) modules.

Csipkes teaches a modular amplifier comprising at least two pump modules, see abstract and fig. 1;

pluggable connectors connecting the modules, see fig. 6;

and a support board see figures 3, 9, and 10.

Becker teaches an optical amplifier comprising a first and a second stage.

It would have been obvious to one of ordinary skill in the art at the time of invention by applicant to modify the apparatus of Yoon by:

providing at least two pump modules in order to pump both amplifier modules;

providing pluggable connectors in order to facilitate easy replacement of a module;

a support board in order to physically stabilize the modules;

and substituting a dual stage amplifier module for the single stage amplifier module of Yoon in order to provide high gain and low noise amplification.

With respect to claim 35, Yoon teaches a method inherent in the apparatus comprising:

- a support board (either the backplane or the frontplane);
- a subunit comprising a plurality of amplification components;
- a subunit comprising a plurality of input stage components; and
- a subunit comprising a plurality of output stage components.

See figures 3 teaching an apparatus comprising: input and output modules 50 and 48; and amplification modules 30 and 32, and figure 4 teaching the input output modules comprising a plurality of components.

Csipkes teach a modular amplifier comprising a separate pump module, see the abstract. Csipkes further teaches pluggable connectors that connect a printed board to an optical backplane. Constructing an optical circuit on a printed board is well known in the art.

It would have been obvious to test the power and wavelength of each pump module for matching specifications and functionality;

to assemble, connect to a known signal source, and to measure the signal present at said output end of each input and output module;

to assemble, connect to a test information signal, connect to a pump source, and to measure the signal at the output end of the signal amplifying module;

to reject any module that does not meet performance requirements, or accept modules that meet requirements;

to mount accepted amplifying, input, output, and pump module on a substrate,

connect each module;

and to test each module

in order to construct an modular optical amplifier that is known to have properly functioning components.

With respect to claim 36, it would have been obvious to mount a second accepted pump module on said substrate;

optically connect said pump module to said amplifying module; and

to test said second accepted pump module on said substrate in order to supply an additional optical power source to the amplifier wherein the functionality of the optical power source is verified and to allow for a soft shutdown.

3. Claims 4,6, and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoon '291 in view of Csipkes '132, as applied to claim 1

or 17 above, and further in view of Ohshima et al. (US 2001/0008459 A1) (hereafter "Ohshima").

With respect to claim 4, Ohshima teaches a pumping module where a plurality of pumping sub-modules are coupled together. See figures 1a, 4, and 8-13. It would have been obvious to modify the apparatus by supplying a plurality of pump modules coupled together in order to provide redundancy.

With respect to claim 6, Ohshima teaches that the first and second pump wavelengths are approximately equal, see paragraph 0009.

With respect to claim 7, Ohshima teaches that the first and second pump wavelengths are different, see paragraph 0009.

4. Claims 8, and 9 rejected under 35 U.S.C. 103(a) as being unpatentable over Yoon in view of Csipkes, as applied to claims 6 and 7 above, and further in view of Becker.

With respect to claim 8, Becker teaches pumping with 980 nm pump light to provide efficient amplification, see page 265. It would have been obvious to modify the apparatus by pumping with 980 nm pump light in order to provide efficient amplification.

With respect to claim 9, Becker teaches that 980 nm pumping light provides low noise, and 1480 nm light provides highly efficient power amplification. It would have been obvious to modify the apparatus by

coupling 980 and 1480 nm light in order to provide a compromise between noise and power in amplification.

Allowable Subject Matter

Claims 19-30 and 37 allowed.

Claims 11-14, 16-18, and 32-34 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

With respect to claims 11-14, the prior art, for example Yoon et al. patent number 6,292,291 and Csipkes et al. patent number 5,778,132, teach a modular optical amplifier apparatuses wherein the input components including a tap coupler serially connected to a photodiode are located in the optical amplification module rather than an/the input components module. The prior art also fails to teach or suggest a benefit of modifying the apparatus by including an isolator serially connected to a supervisory channel drop unit connected; an attenuator serially connected to the supervisory channel drop unit, and a receiver serially connected to the channel drop unit.

With respect to claims 16-18, Yoon fails to teach designs for a first to fourth amplifier configuration.

With respect to claims 19-30, the prior art fails to teach an optical amplifier component groups wherein each component group includes a maximum number of components common to each of the first, second, third, and fourth optical fiber amplifiers; and

forming an optical signal amplifying components subset group, and input components subset group, an output components subset group, each components subset group having the minimum number of said optical component common to each of said respective components groups for each of said first through fourth optical fiber amplifiers. The art fails to teach or suggest grouping each component subset group having a minimum number of optical components common to each amplifier design.

With respect to claims 32-34, the nearest prior art is Yoon. The prior art fails to teach or suggest alternative modules of alternative components which may be substituted for the initial modules in order to make a different optical amplifier, as claimed by the applicant.


With respect to claim 37, Yoon fails to teach manufacturing n different types of subunits.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen C. Cunningham whose telephone number is 703-605-4275. The examiner can normally be reached on Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas G. Black can be reached on 703-305-8233. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular communications and 703-872-9327 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1113.

November 4, 2003


THOMAS G. BLACK
SUPERVISORY PATENT EXAMINER
GROUP 302